Prometheus Unbound: Digitalization and Industrial Revolution 4.0

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1. Introduction

- **Emergence of Broadband cables and IR4.0 technologies**

- Broadband cables from the 1990s – digitalization, command navigation, mass storage of data offered the platform to spur transition from IR3.0 systems to IR4.0 systems

- Turn of millennium – IR technologies through deployment of robots (e.g. BMW in South Africa with command from Germany

- **Formal declaration of IR4.0 systems by German government in 2011 from when countries began expanding the laying of broadband infrastructure, internet of things, big data analytics, and cloud computing facilities to stimulate the use of robots and drones in economic activity.**
- **While specialized firms expanded in numbers to develop robots and drones for a wide range of purposes, governments began developing the infrastructure (or ecosystem) to stimulate their use.**

2.1 Divisive debates on Digitalization and IR4.0 systems

- Epochal changes from the advent of new technologies creates Prometheus with two sides.
- The mystical Ned Ludd emerged as workers rebelled (1799) against mechanization.
- Skilful weavers and knitters opposed mechanised looms and knitting machines by breaking machines and burning factories after the British government did not respond to their concerns.
- The Luddite resistance to mechanization ended by 1813 as manufacturing absorbed standardization, inter-changeability, and flow (conveyor belt) to stimulate mass production.
- Jobs lost were created in other activities relieving concerns over mass retrenchments.
- While deskilling and restructuring reduced worker tasks to differentiated, monotonous, and repetitive activities, it also created hierarchies that supported management and technical tasks, which was later differentiated further under Fordism but with a rise in technical specialization and wages before being creatively flexibilized.
- Digitalization and IR4.0 technologies has become integral to the 17 sustainable development goals launched by the UN in 2015. While the COVID19 pandemic has quickened to contain the spread of the virus through social distancing to prevent the spread of the disease, Israel and Taiwan embarked on it earlier to appropriate economic synergies from such technologies.

2.2 Divisive debates on Digitalization and IR4.0 systems

- Taiwan relocated back agricultural farms and manufacturing firms to increased self-sufficiency through deployment of robots and drones.
- Huawei presents some of the exciting developments on what IR4.0 technologies offer for the near future.
- The proliferation of IR4.0 technologies has invoked concerns among workers and worker organizations over the future of work.
- From deskilling to enskilling opening up of humans' mental faculties to allow workers to realise their creative self. If Freire had used the metaphor of 'day in day out, if workers are just loading bricks onto wheelbarrows before pushing and eventually unloading them at construction sites, which is something that horses or donkeys could do', changes in work now can be expected to offer workers the opportunity to evolve their innovative capabilities to realise their creative selves.
- However, such a transformation brings with it serious challenges, i.e., unless the workers have trained themselves to evolve their mental faculties and governments are ready to finance their knowledge-based retraining, the flipside of new technologies, of creating mass unemployment, may become the order of the day. On one hand, lack of resources prevents poor countries (and poor people) in middle income and rich countries to confront the digital divide.
- Both experiential and tacit knowledge are critical and though their early articulations have been philosophical with examples that are dated now, the new manifestations do not break the boundaries of such conceptualizations just as the structure and concept of the computer is still visible in Babbage's 1868 articulation of it.
- From flexible casualization to creative flexibilization.

3.1 Embedding Ecosystem

- While scholars are divided in the conceptualization of technical change, they concur that the ecosystem is critical to stimulate firms connecting with digitalization to adopt IR4.0 practices.
- Governments have launched roadmaps to accelerate the development of the digital infrastructure.
- Malaysia's Digital Free Trade Zone was launched by the Prime Minister in 2017 with the assistance of Jack Ma, while the IR4.0 Master Plan and the Malaysian Digital Economy Blueprint were launched in 2018 and 2020 respectively.
- The latter two target digitalization and absorption of IR4.0 technologies till 2030. Significant efforts have since been taken by particular ministries to implement digitalization initiatives with development as the focus.
- Such efforts have not tangibly shifted from readiness assessment to actual action plans to quicken execution, including sequencing to ensure its effective and efficient implementation.
- While one can quibble with some aspects of the Malaysian blueprints on digitalization and industry 4.0 technologies, it does show the government's seriousness to catch the wave of change through proactive policies. Both the Twelfth Malaysia Plan and the 2022 budget reflect some of their proactive initiatives.

3.2 Embedding Ecosystem

- The Malaysian government has invested in a number of programmes that provide access to digital technology and to also provide the necessary basic services, (including for the upgrading of digital knowledge and skills). The government also recognises the need to bridge the digital divide through meaningful policies that address issues of empowerment.
- As we embrace this digital era, we need to move the economy forward to achieve the goals identified in Malaysia's Shared Prosperity Vision blueprint through a focus on quickening innovations as part of a comprehensive digital economy directed at driving the country towards a prosperous, egalitarian, and sustainable nation (see Malaysia, 2020). This conference addresses aspects of the digital infrastructure, digital literacy and cyber security, which is timely and pertinent as a platform to deliberate the various issues related to digital transformation in the era of IR 4.0.
- While technological advancement through digitalization and IR4.0 technologies has extended further the unbound Prometheus, it is simply too broad a concept to target its capture in a single book. Hence, inevitably this conference seeks to present an exhaustive account of the various sectors, and activities through which digitalization and IR4.0 technologies will impact on Malaysia's development.
- Instead, the conference focuses on selected critical sectors where the ecosystem for its implementation and synergistic development need strengthening to usher a comprehensive appropriation of the associated synergies.
- Landes (2003) provided the unbound Prometheus account from 1750 till the turn of the millennium.

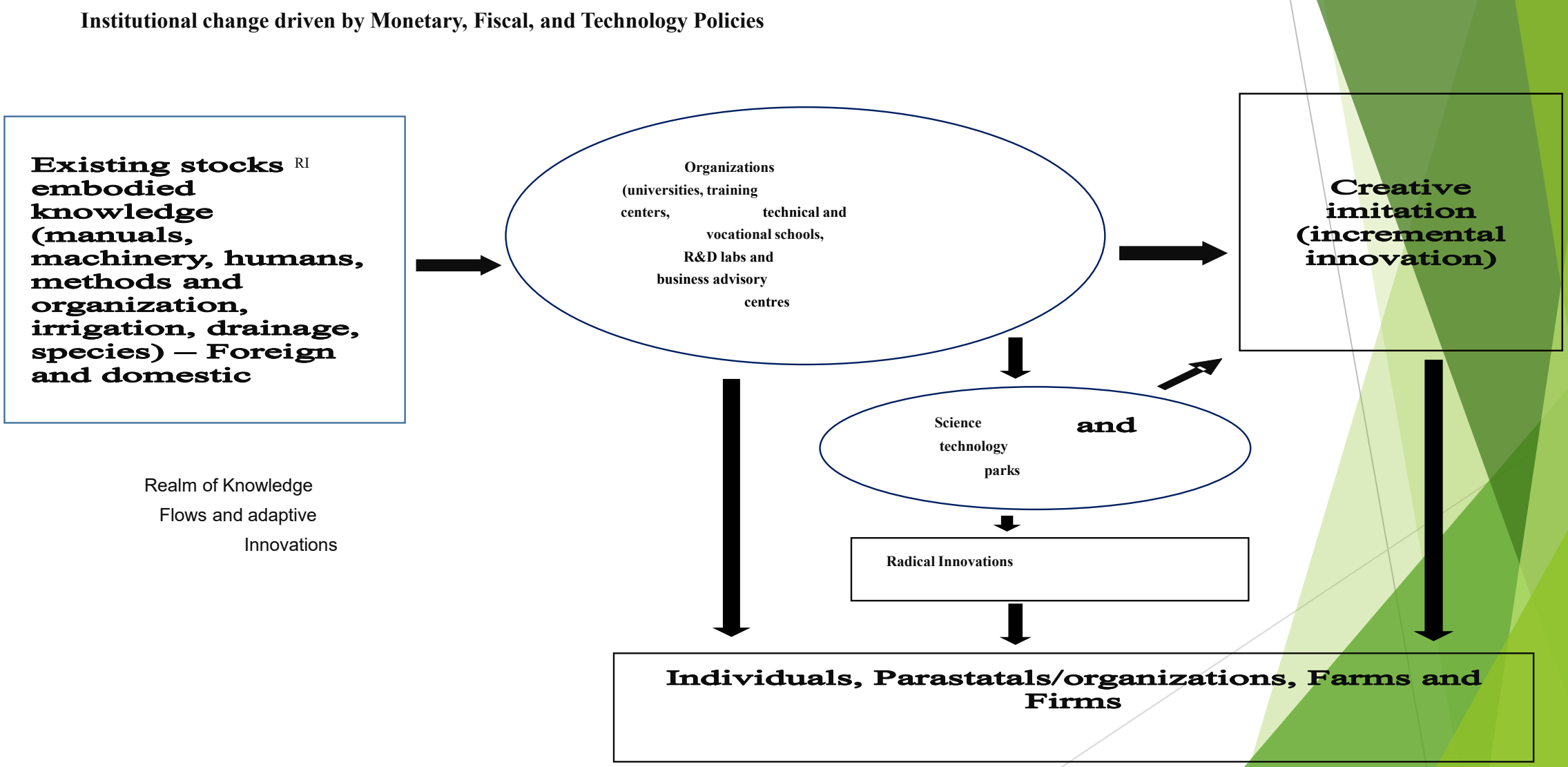
4. Critical Pillars

- While digitalization promises the diffusion of IR4.0 technologies, nations can open up the discourse to enable the open development of such technologies, but because economic resources are scarce many will have to focus on a few critical sectors to accelerate its emergence and expansion optimally.
- Consequently, the conference focuses on selected critical areas that will become important pillars for Malaysia's development.
- Considerations are given to appropriating collective synergies, solving collection action problems, stimulating inter-sectoral interdependence, and structural complementarities.
- Hence, the conference focuses on manufacturing, agriculture, services, connectivity and coordination with intermediary organizations and government, the shift from mass production to mass customization, and on the importance of addressing cybercrime.

4. Critical Role of Innovation

- The successful promotion of the embedding ecosystem for IR4.0 technologies must emphasize the role of knowledge networks to continuously evolve upgrading in the economy
- Figure 1 shows the critical intermediary organizations essential to support the application and spread of IR4.0 systems, with a focus on evolving a national network for knowledge flows, adaptive and inventive creation, and diffusion.
- In addition, national ecosystems also require cybersecurity systems to insulate knowledge networks from piracy, plunder and pillage.

Figure 1: Knowledge Network for Stimulating Innovation



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- The papers presented at this conference are forthcoming in the book:
- Rasiah, R., Wai Yun, Low and Nurliana Kamaruddin (2023) Digitalization and Development: The Ecosystem for Promoting IR4.0 Technologies in Malaysia, London: Routledge.